

EXCESSIVE SLEEPINESS AND SELECTED ASPECTS OF FUNCTIONING AND THE QUALITY OF LIFE OF PATIENTS SUFFERING FROM OBSTRUCTIVE SLEEP APNOEA

Lidia Mostowik^{1A,B,C,F}, Marlena Padykuła^{2D,F}, Joanna Zofia Sułkowska^{3C,E,F}, Ilona Kuźmich^{1C,F}, Ewa Kawalec-Kajstura^{1A,D,E,F}

¹Department of Internal Medicine and Community Nursing, Institute of Nursing and Midwifery, Faculty of Health Sciences, Jagiellonian University Medical College, Krakow, Poland

²Department of Clinical Nursing, Institute of Nursing and Midwifery, Faculty of Health Sciences, Jagiellonian University Medical College, Krakow, Poland

³PhD student, Department of Internal Medicine and Community Nursing, Institute of Nursing and Midwifery, Faculty of Health Sciences, Jagiellonian University Medical College, Krakow, Poland

Authors' contribution:

A. Study design/planning • B. Data collection/entry • C. Data analysis/statistics • D. Data interpretation • E. Preparation of manuscript • F. Literature analysis/search • G. Funds collection

Address for correspondence:

Joanna Zofia Sułkowska, PhD student
Department of Internal Medicine
and Community Nursing
Institute of Nursing and Midwifery
Faculty of Health Sciences
Jagiellonian University Medical College
25 Kopernika St., 31-501 Krakow, Poland
e-mail: sulkowska.joasia@gmail.com

SUBMITTED: 08.05.2020

ACCEPTED: 28.05.2020

DOI: <https://doi.org/10.5114/ppiel.2020.98767>

ABSTRACT

Introduction: Obstructive sleep apnoea (OSA) may be observed in as much as 22% of men and 17% of women. It affects the structural organisation of sleep and may lead to numerous negative consequences.

Aim of the study: Assessment of the intensity of sleepiness during the day and its influence on selected aspects of daily functioning of patients suffering from OSA.

Material and methods: The study was carried out in a group of 49 patients whose average age was 55.27 ± 12.80 years. The diagnostic survey method was used with the application of a self-designed questionnaire, Epworth Sleepiness Scale (ESS) and WHOQOL-BREF scale.

Results: The average ESS score obtained by the respondents was 10.11 ± 5.60. The incidence of mild excessive daytime sleepiness was observed in 42.86% of patients, whereas 16.33% of respondents suffered from severe excessive daytime sleepiness. The most frequent problem reported by respondents was daytime fatigue, which was observed in 87.76% of cases. The general quality of life (QoL) was relatively high (4.96 ± 0.78). The environment domain was rated the highest (15.42 ± 1.89), and psychological – the lowest (12.68 ± 2.53).

Conclusions: A significant correlation was found between respondents' age and the intensity of daytime sleepiness. Higher ESS scores were observed in patients who experienced sleepiness and fatigue after a full night of sleep, had difficulties fulfilling their household chores due to tiredness and/or sleep deprivation, or suffered from memory and/or concentration problems. No correlation was observed between the intensity of perceived daytime sleepiness and the QoL.

Key words: quality of life, obstructive sleep apnoea, functioning, excessive sleepiness.

INTRODUCTION

Obstructive sleep apnoea (OSA), which is the most common form of sleep-disordered breathing (SDB), is a widespread health problem in the population of highly developed countries and can be diagnosed in 22% of men and 17% of women [1]. In Poland it is estimated that 16.7% of men and 5.4% of women suffer from OSA [2].

Factors that increase OSA risk include: male gender, age (over 40 years in the case of men and 50 years in the case of women), high blood pressure, obesity, neck size (neck circumference ≥ 43 cm in the case of men and ≥ 41 cm in the case of women), hypothyroidism, acromegaly as well as smoking and drinking alcohol (especially before bedtime), taking some medi-

cines (including sedatives), and also some anatomical upper airway and facial skeleton anomalies [3, 4].

The condition is characterised by recurrent episodes of cessation of breathing (apnoea) and shallow breathing (hypopnoea) during sleep when the muscles of soft palate, uvula, tongue, and the back wall of the throat become too relaxed and, consequently, the airway becomes partially or completely blocked despite regular chest and abdominal breathing movements. As a result, the efficiency of pulmonary ventilation is decreased (incidents of hypoxia and hypercapnia), the pressure inside chest tends to fluctuate, and the sympathetic nervous system is activated [4-6].

Obstructive sleep apnoea is diagnosed when at least five incidents of apnoea are observed and the

breaks between consecutive breaths exceed 10 seconds, reduction in upper airflow reaches at least 50% of the initial flow, and the reduction in arterial blood oxygen saturation exceeds 4% [4, 5].

Obstructive sleep apnoea symptoms can be divided into night symptoms that affect the quality of sleep and daytime symptoms. The most characteristic night-time symptoms include loud snoring, shortness of breath, choking sensation, frequent awakening during the night, periodic limb movements, and excessive sweating. The daytime symptoms include, for example, excessive daytime sleepiness, morning fatigue and headaches, decline in cognitive processes and concentration, lower libido, irritability, and mood swings [5, 7, 8].

Moreover, obstructive sleep apnoea is responsible for sparking off the mechanisms that can have a serious negative impact on health; for instance, cardiovascular problems (hypertension, cardiac arrhythmias), pulmonary problems (pulmonary hypertension), or metabolic disorders (e.g. insulin resistance, diabetes) [2, 9].

Obstructive sleep apnoea also has a negative influence on daily biopsychosocial functioning. The incidence of sleep pattern disorders accounts for the fact that patients wake up feeling tired, easily doze off during the day or while performing daily routines, have problems with concentration, and suffer from lowered mood. As a result, they tend to isolate themselves and have difficulties maintaining positive interpersonal relations. However, it cannot be denied that an increased risk of home and work accidents as well as road accidents should be mentioned as the most serious consequence of an excessive daily sleepiness [3, 9]. Most of these phenomena become more intense with increasing sleepiness during the day [10].

AIM OF THE STUDY

The objective of the study was to assess the intensity of sleepiness during the day and its influence on selected aspects of daily functioning of patients suffering from obstructive sleep apnoea.

MATERIAL AND METHODS

The study was carried out in a group of patients hospitalised on a pulmonology ward in one of the hospitals in the Małopolska region. The examined group consisted of 49 patients (19 women and 30 men) diagnosed with obstructive sleep apnoea. They gave their informed written consent to participate in this project. The respondents were aged between 27 and 80 years (the average age was 55.27 ± 12.80 years).

The study was conducted with the application of a diagnostic survey method making use of the following research tools: a self-designed question-

naire, the Epworth Sleepiness Scale (ESS), and a brief WHOQOL-BREF scale (World Health Organisation Quality of Life-BREF).

The self-designed questionnaire consisted of a sociodemographic part and 12 questions referring to selected aspects of respondents' physical, social, and emotional functioning.

The Epworth Sleepiness Scale is a research tool that allows the assessment of the intensity of daytime sleepiness while being engaged in particular daily activities. In general, ESS scores can be interpreted as follows: 0-9 – normal daytime sleepiness, 10-14 – moderate excessive daytime sleepiness, 15-24 – severe excessive daytime sleepiness [11].

The WHOQOL-BREF scale is an instrument aimed at assessing general quality of life as well as all its domains (physical health, psychological, social relationships, and environment). The scale makes it possible to assess an individual's overall perception of quality of life and an individual's overall perception of their health [12-14].

The statistical analysis was conducted with the application of STATISTICA 10.0 PL. Calculations were carried out by means of the following tests: χ^2 test, Kruskal-Wallis test, *U* Mann-Whitney test, and Spearman's rank correlation coefficient. In all analyses the significance level was set at $\alpha = 0.05$.

The study was conducted following the ethical principles of the Declaration of Helsinki and the Convention on Human Rights and Biomedicine of the Council of Europe.

RESULTS

The study was conducted in a group of 49 people (19 women and 30 men) aged between 27 and 80 years. The group of respondents aged between 51 and 60 years was the most numerous, whereas the least numerous was the group of respondents aged under 40 years. The average age of patients was 55.27 ± 12.80 years. The lowest percentage of respondents had only elementary education (4.08%; $n = 2$), whereas secondary education was declared by 32.65% of patients ($n = 16$), and the same number of people declared higher education. The remaining group was made up of patients with vocational education. Professionally active people made up 32.65% of the patients ($n = 16$). Most of the respondents considered their financial status to be average; good or very good financial status was declared by 28.57% of patients ($n = 14$), and 10.21% of them ($n = 5$) regarded their financial status as bad or very bad.

Epworth Sleepiness Scale is an instrument that allows for subjective assessment of the intensity of excessive daytime sleepiness in a group of OSA patients. The average ESS score obtained by the respondents was 10.11 ± 5.60 (Table 1).

Table 1. Descriptive statistics of Epworth Sleepiness Scale (ESS)

	N	M	Me	Mo	Min	Max	SD
ESS score	49	10.11	9	5	2	24	5.60

M – average value, *Me* – median, *Mo* – modal value, *Min* – minimum, *Max* – maximum, *SD* – standard deviation

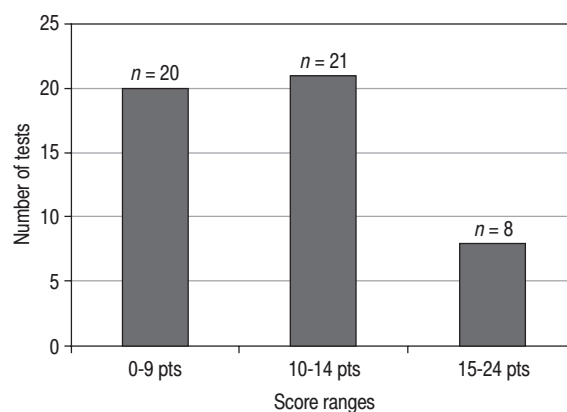
The patients with moderate excessive daytime sleepiness made up the most numerous group (42.86%; $n = 21$), whereas severe excessive daytime sleepiness was observed in 16.33% of patients ($n = 8$). The assessment of the intensity of daytime sleepiness according to ESS scale is presented in Figure 1.

Respondents were asked about their problems/complaints that stem from abnormal respiration during sleep and impede their daily functioning (Table 2).

Daytime fatigue was the most frequent problem reported by the respondents (87.76%; $n = 43$), whereas the lowest percentage of the respondents noticed a negative influence of fatigue/sleep deprivation on their sexual life (32.66%; $n = 16$).

Overall perception of quality of life assessed by OSA patients reached an average level of 4.96 ± 0.78 . The environmental domain received the highest scores, and the psychological one – the lowest (12.68 ± 2.53), which means that in this domain the respondents assessed their quality of life as average. As far as respondents' self-assessment of their health is concerned, the average score in the examined group was 3.11 ± 0.97 (Figure 2).

An analysis of a correlation between particular sociodemographic factors and the intensity of excessive sleepiness assessed according to the ESS scale showed a negative correlation between respondents age and their ESS score ($R = -0.283$, $p = 0.048$). Younger patients felt more severe sleepiness as compared to older patients. The other sociodemographic factors analysed in the study (gender, education, pro-

**Figure 1.** Epworth Sleepiness Scale scores – interpretation

fessional activity, and financial status) had no significant influence on the perception of daytime sleepiness in the examined group.

An analysis of the authors' own studies showed a correlation between ESS scores and the complaints reported by the respondents, including sleepiness/fatigue after a full night of sleep, daytime fatigue, difficulties with performing household duties because of fatigue and/or sleep deprivation, and memory and/or concentration problems. The patients who reported these problems scored significantly higher on the ESS scale than the patients who did not experience these problems ($p = 0.024$, 0.004 , 0.011 , and 0.022 , respectively).

Table 2. OSA-related problems/complaints reported by the respondents and impeding their daily functioning

Problem/complaint	Yes		No		I don't know	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Fatigue and excessive sleepiness after a full night of sleep	35	71.43	11	22.45	3	6.12
Daytime fatigue	43	87.76	6	12.24	0	0.00
Difficulties with performing household duties resulting from fatigue and/or sleep deprivation	32	65.31	13	26.53	4	8.16
Difficulties with performing work-related duties resulting from fatigue and/or sleep deprivation	27	55.10	16	32.66	6	12.24
Memory and/or concentration problems	31	63.27	14	28.57	4	8.16
Irritability, anxiety, likelihood of losing one's temper (due to tiredness or sleep deprivation), frequent conflict situations	32	65.31	10	20.41	7	14.28
Problems with bad mood (lower mood)	28	57.14	11	22.45	10	20.41
Negative impact on undertaken physical activity	35	71.43	10	20.41	4	8.16
Negative impact of fatigue/sleep deprivation on sexual life	16	32.66	18	36.73	15	30.61

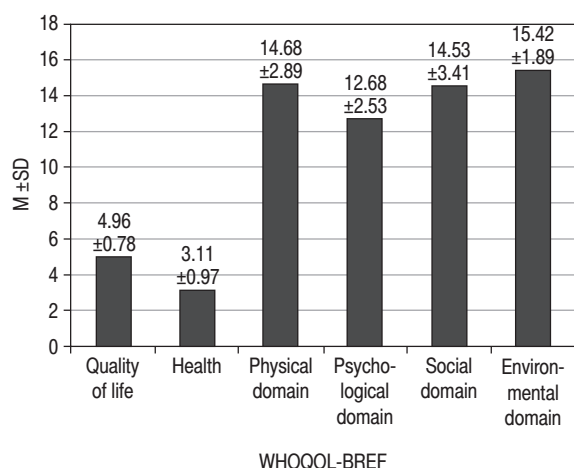


Figure 2. Assessment of life quality based on WHOQOL-BREF scale

The subject of another analysis was the influence of problems resulting from sleep disorders on respondents' quality of life. The quality of life was significantly higher in the group of respondents who did not experience fatigue/sleepiness after a full night of sleep than in the group of respondents who reported this problem ($p = 0.044$). A significantly lower quality of life was typical of the people who declared that their fatigue/sleepiness had a negative impact on their sexual life, in comparison to the respondents who did not notice a correlation between their OSA problems and their sexual life ($p = 0.008$). The other complaints reported by the respondents had no significant impact on the respondents quality of life ($p > 0.05$).

No correlation was found between the level of perceived excessive daytime sleepiness and respondents' quality of life ($R = -0.224$, $p = 0.122$).

DISCUSSION

Obstructive sleep apnoea consists of recurrent cessation of breathing and episodes of shallow breathing during sleep [15]. OSA may have various aetiology and intensity; however, even its mild form is connected with the incidence of numerous consequences of hypoventilation such as excessive daytime sleepiness and other conditions, which are followed by deterioration of biopsychosocial functioning [5, 7, 8].

The most frequent complaints in the examined group of respondents included the following: daytime fatigue (87.76%), fatigue after a full night of sleep (71.43%), irritability, anxiety, likelihood of losing one's temper and more frequent conflict situations (65.31%), memory and concentration problems (63.27%), and lowered mood (57.14%).

The incidence of excessive daytime sleepiness was a significant discomfort for OSA patients. Excessive daytime sleepiness accounts for frequent prob-

lems of dozing off during activities such as watching TV, reading, and even during a conversation [2]. In the studies conducted by Dębska *et al.* about half of the respondents reported excessive daytime sleepiness, and about one third of them reported severe excessive daytime sleepiness [16]. Similar findings were obtained by the authors of this study with mild excessive daytime sleepiness in 42.86% of cases and severe excessive daytime sleepiness in 16.33% of respondents.

As was presented in the studies of other authors, the intensity of perceived excessive daytime sleepiness was affected by factors such as age, gender, and socioeconomic status [17]. This study, in turn, after analysing sociodemographic features such as age, gender, education, professional activity, and economic status, discovered a statistically significant correlation only between respondents age and the intensity of perceived daytime sleepiness. The intensity of excessive daytime sleepiness tends to decrease with respondents' age ($R = -0.283$, $p = 0.048$). The lack of correlation between the other features might have resulted from a low number of respondents. Therefore, it seems to be well based to conduct research in a more numerous group of patients.

Sleep is one of the basic physiological needs, and thus its deficiency, abnormal architecture, or disorders may give rise to a number of negative physical, psychological, and social consequences [18]. An analysis of scientific publications shows that one of the most acute effects caused by obstructive sleep apnoea is difficulty in performing household and professional duties. In turn, it significantly contributes to a decrease in patients' self-assessment of quality of life [16, 17, 19]. Studies show that 65.31% of respondents find it difficult to perform their household duties because of their tiredness, whereas 55.10% have similar difficulties with their work-related duties. Moreover, the patients who reported difficulties with performing their household chores scored significantly higher on the ESS scale than the patients who did not report such problems ($p = 0.011$).

In the authors' own study, overall quality of life was assessed as high. The domain of environment obtained the highest scores, whereas the domain of psychology – the lowest. The respondents who reported fatigue and sleepiness after a full night of sleep assessed the quality of life the lowest. The studies of other authors indicate that the factors such as age, gender, education, duration of the disease, and place of residence affect quality of life [17, 20–22]. On the other hand, this study did not prove a correlation between WHOQOL-BREF scores and patients' age, gender, and professional activity, which might be explained by lack of representativeness of the examined group.

Sleep structure disorders and night-time hypoxia, which are typical of OSA patients, lead to excessive daytime sleepiness and, consequently, to a decrease

in the efficiency of cognitive processes, difficulties in daily functioning (both in psychological and social spheres) and, as a result, lower quality of life and even an increased risk of life-threatening injuries and accidents. These observations have been confirmed by the studies of numerous authors as well as by the results obtained by the authors of this study [23, 24].

In this context, it seems particularly important to take all possible measures in order to improve OSA patients' quality of sleep of and, by the same token, their biopsychosocial condition. These measures include health education, which is a crucial complement of appropriate treatment. This education should be aimed at the specific needs and problems of OSA patients. In order to achieve it, further wide-reaching research must be carried out in this group of patients [8, 15].

CONCLUSIONS

In the examined group, the percentage of patients with moderate/mild excessive daytime sleepiness was the highest, while percentage of patients with pathological daytime sleepiness was lowest.

As far as sociodemographic characteristics are concerned, a statistically significant correlation was found only between respondents' age and the intensity of daytime sleepiness. Younger patients felt drowsier compared to older respondents.

The patients who experienced sleepiness and fatigue after a full night of sleep, difficulties in fulfilling their household chores due to tiredness and/or sleep deprivation, as well as memory and/or concentration problems obtained higher ESS scores in comparison with the respondents who did not report such problems.

No correlation was observed between the intensity of perceived daytime sleepiness and respondents' quality of life.

Disclosure

The authors declare no conflict of interest.

References

- Franklin KA, Lindberg E. Obstructive sleep apnea is a common disorder in the population – a review on the epidemiology of sleep apnea. *J Thorac Dis* 2015; 7: 1311-1322.
- Sykt A, Ślusarska B, Jędrzejewicz B, et al. Zaburzenia snu jako powszechny problem społeczny – wybrane uwarunkowania i konsekwencje zdrowotne. *Pielęg XXI w* 2017; 16: 53-59.
- Szaulińska K, Pływaczewski R, Sikorska O, et al. Obturacyjny bezdech senny w ciężkich chorobach psychicznych. *Psychiatr Pol* 2015; 49: 883-895.
- Binko P, Wysokiński A. Obturacyjny bezdech senny i jego związek z nadciśnieniem tętniczym – wciąż aktualny temat. *Chor Serca Naczyń* 2018; 15: 226-231.
- Hasiec A, Szumowski Ł, Walczak F. Obturacyjny bezdech – senny zabójca. *Forum Med Rodz* 2012; 6: 103-114.
- Domaradzki D, Stryjewski PJ, Konieczńska M, et al. Obturacyjny bezdech senny – diagnostyka i postępowanie terapeutyczne. *Folia Cardiol* 2016; 11: 253-259.
- Dobrowolska-Zarzycka M, Szymańska J. Obturacyjny bezdech senny. *Pol J Publ Health* 2012; 122: 430-433.
- Szymańska J, Dobrowolska-Zarzycka M. Objawy, powikłania i leczenie obturacyjnego bezdechu sennego. *Med Ogólna Nauki Zdr* 2013; 19: 391-396.
- Czajkowska-Malinowska M, Cofta S. Obturacyjny bezdech senny i jego społeczne następstwa. *KOSMOS. Probl Nauk Biol* 2014; 63: 267-274.
- Kowara MK, Fałęcki W, Szymański FM. Obturacyjny bezdech senny – dlaczego należy go rozpoznawać i leczyć w grupie kierowców? *Chor Serca Naczyń* 2016; 13: 92-98.
- Johns M. A new method for measuring daytime sleepiness: the Epworth Sleepiness Scale. *Sleep* 1991; 14: 540-545.
- Wołowicka L, Jaracz K. Jakość życia w naukach medycznych. Wydawnictwo Uczelniane Akademii Medycznej w Poznaniu, Poznań 2001; 231-238.
- Gnacińska-Szymańska M, Dardzińska JA, Majkiewicz M, et al. Ocena jakości życia osób z nadmierną masą ciała za pomocą formularza WHOQOL-BREF. *Endokrynol Otyłość* 2012; 8: 136-142.
- The World Health Organization. The World Health Organization Quality of Life (WHOQOL)-BREF. 2004. https://www.who.int/substance_abuse/research_tools/en/polish_whoqol.pdf (access: 21.01.2020).
- Grabowska H, Grabowski W, Flis A, et al. Pielęgnowanie chorego z obturacyjnym bezdechem sennym z wykorzystaniem międzynarodowej terminologii ICNP. *Probl Pielęg* 2016; 24: 142-147.
- Dębska G, Ławska W, Ziółkowska A. Wpływ obturacyjnego bezdechu sennego na jakość życia pacjenta. *Piel Zdr Publ* 2011; 1: 313-320.
- Stepnowsky C, Sarmiento KF, Bujanover S, et al. Comorbidities, health-related quality of life, and work productivity among people with obstructive sleep apnea with excessive sleepiness: findings from the 2016 US National Health and Wellness Survey. *J Clin Sleep Med* 2019; 15: 235-243.
- Çalışkan H, Ertürk N, Kütükçü EÇ, et al. The relationship between the physical activity level and fatigue perception, quality of life and psychological status in patients with obstructive sleep apnea syndrome. *J Turk Sleep Med* 2019; 6: 1-6. http://cms.galenos.com.tr/Uploads/Article_26096/JTSM-6-1.pdf (access: 02.04.2020).
- Engleman HM, Douglas NJ. Sleepiness, cognitive function, and quality of life in obstructive sleep apnoea/hypopnea syndrome. *Thorax* 2004; 59: 618-622.
- Głębocka A, Kossowska A, Bednarek M. Obstructive sleep apnea and the quality of life. *J Physiol Pharmacol* 2006; 57: 111-117.
- Muszałik M, Kędziora-Kornatowska K. Jakość życia przewlekłych chorych pacjentów w starszym wieku. *Gerontol Pol* 2006; 14: 185-189.
- Kurowska K, Jasińska E. Samoocena jakości życia i poczucia koherencji osób z rozpoznaniem obturacyjnego bezdechu sennego. *Farmacja Współczesna* 2016; 9: 11-17.
- Gałecki P, Florkowski A, Zboralski K, et al. Psychiatryczne i psychologiczne powikłania zespołu obturacyjnego bezdechu sennego. *Pneumonol Alergol Pol* 2011; 79: 26-31.
- George CFP. Driving and automobile crashes in patients with obstructive sleep apnoea/hypopnea syndrome. *Thorax* 2004; 59: 804-807.